REDUCING FUEL CONSUMPTION: A MARITIME ENERGY PORTFOLIO MANAGEMENT APPROACH

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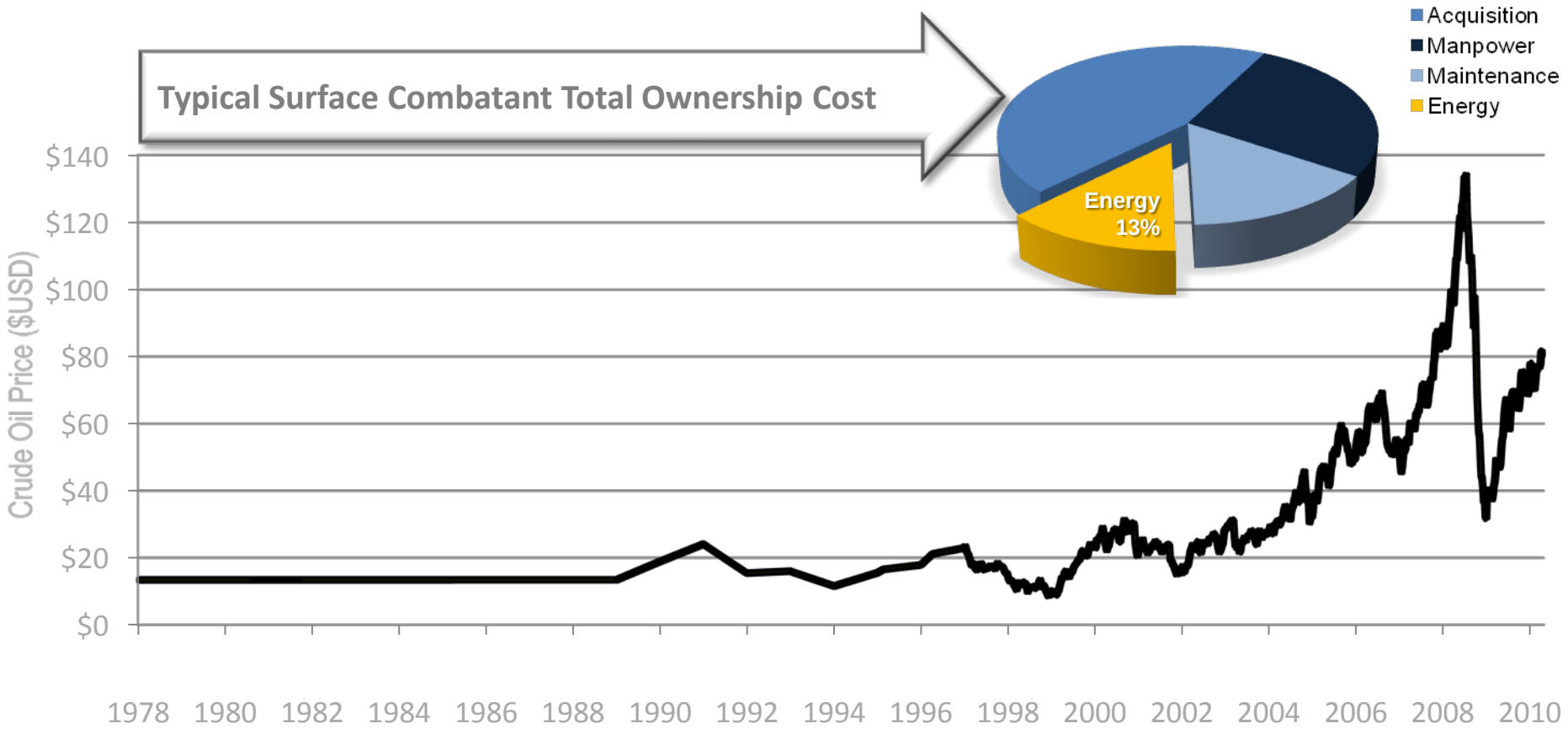
Outline

- ENERGY AS A NAVY IMPERATIVE
- ENERGY DECISION FRAMEWORK
- MARITIME ENERGY PORTFOLIO PROCESS
- IMPACT TO NAVSEA ENERGY PROGRAM

Navy Energy Profile



Energy Demands and Costs Continue to Rise

Manpower and Maintenance Budgets are Challenged

We Have the Ability to Control Acquisition Costs

US Navy Tactical Energy Goals

INCREASE ALTERNATIVE ENERGY USE DON-WIDE

- By 2020, 50% of total DON energy consumption will come from alternative sources.

SAIL THE "GREAT GREEN FLEET"

- DON will demonstrate a Green Strike Group in local operations by 2012 and sail it by 2016.

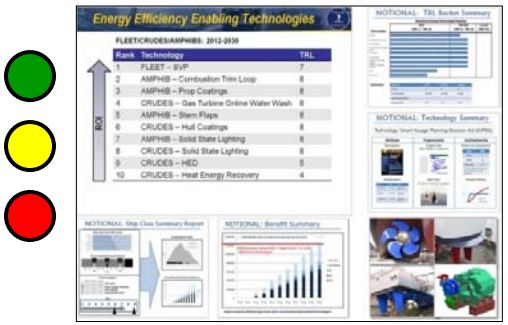
ENERGY EFFICIENT ACQUISITION

- Evaluation of energy factors will be mandatory when awarding contracts for systems and buildings.

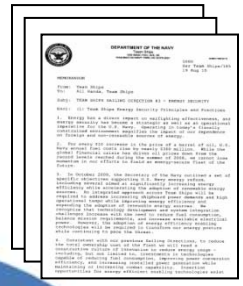
EFFICIENCY AND CONSERVATION AFLOAT

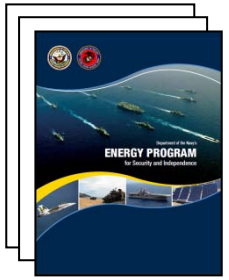
- By 2020, the Navy will increase efficiency and reduce overall fuel consumption afloat by 15%.

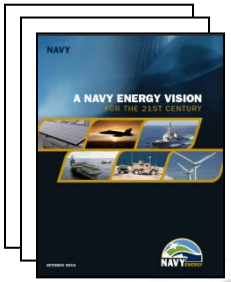
Energy Decision Framework



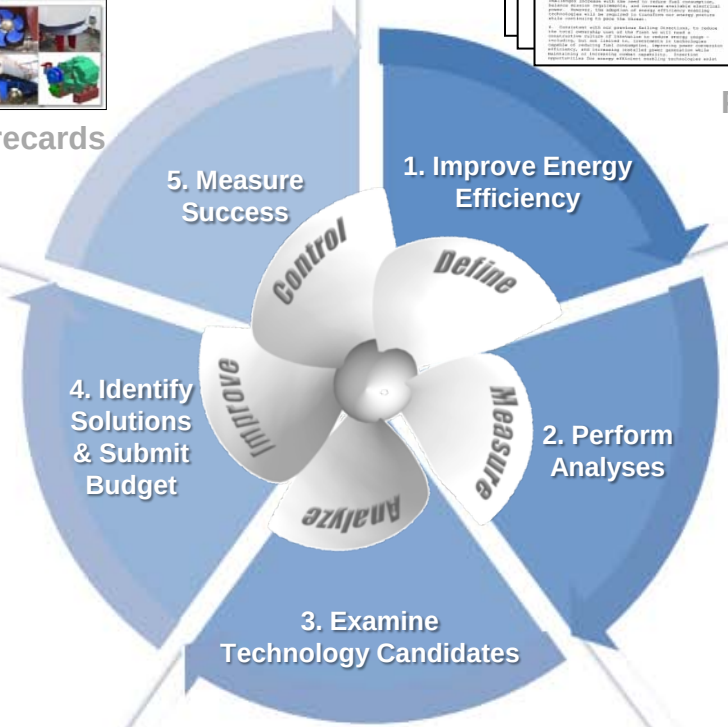
Evaluate Energy Scorecards



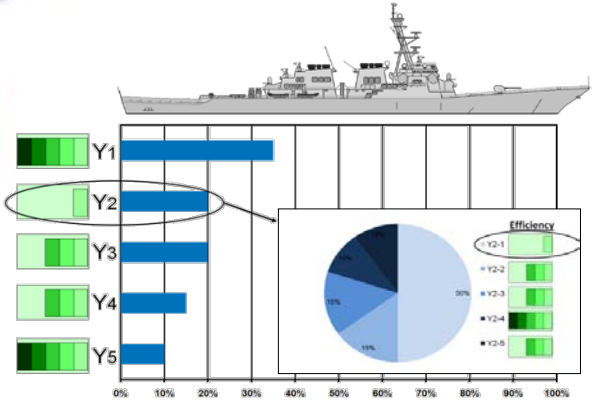




Policy & Guidance



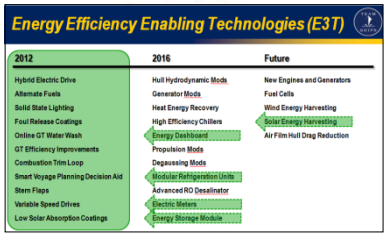
Analyze Fuel Consumption



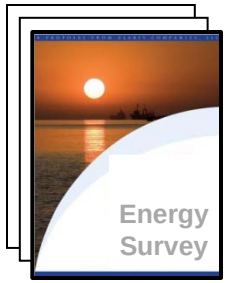
Identify Inefficiencies

INITIATIVE	2012	2013	2014	2015	2016	FYDP	RS
FPRADP	1.8	1.4	1.5	1.9	4.0	12.6	Programs
4 MW SSTG / PDSS RDTE	4.3	9.9	16.2	11.0	4.9	46.5	M86
Energy Storage RDTE	5.0	3.0	3.0	3.0	6.0	20.0	M86 RDTE
Smart Voyage Planning / Fleet Scheduler	3.4	0.0	0.0	0.0	0.0	3.4	M43
Nuclear Studies	2.0	2.3	2.3	2.2	2.3	10.7	M88
Hull Coatings	2.0	2.4	8.0	4.8	2.8	20.0	O&M
Propeller Coatings	0.2	0.2	0.6	0.2	0.3	2.4	
Combustion Trim Loop	0.4	0.4	0.4	0.2	0.0	1.4	
L-Ship Directional Stability	0.9	1.8	1.8	1.8	1.8	8.1	M85
Online GT Waterwash	0.6	1.4	1.4	1.4	1.4	6.2	
Marine Gas Turbine Initiatives	2.4	2.4	2.4	2.4	2.4	12.0	
Solid State Lighting (Amphib)	0.9	1.1	1.6	1.6	1.6	6.8	M85 OPN
Solid State Lighting (Crudes)	3.2	3.2	3.2	3.2	3.2	17.5	M86
Stern Flaps (LHD)	0.8	0.8	1.6	0.0	0.8	4.0	
Stern Flaps (LSD)	1.6	1.6	1.6	1.6	0.8	7.2	
HED OPN	0.0	0.0	17.0	46.0	47.0	110.0	OPN
LM2500 Efficiency RDTE	8.0	11.0	2.0	0.0	0.0	16.0	M86 RDTE
LM2500 Efficiency OPN	0.0	0.0	0.0	8.0	12.0	20.0	M86 OPN
Energy Dashboard / Hydrodynamics	5.1	1.0	0.8	0.2	1.9	9.0	M43 RDTE
TOTAL	38.4	44.3	65.5	92.1	93.5	333.8	

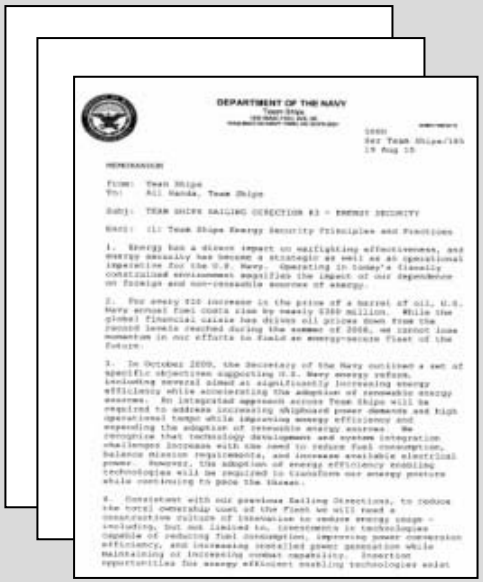
Develop Implementation Plan

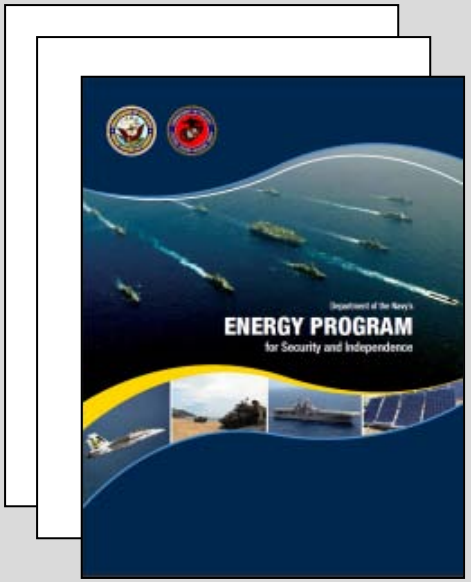


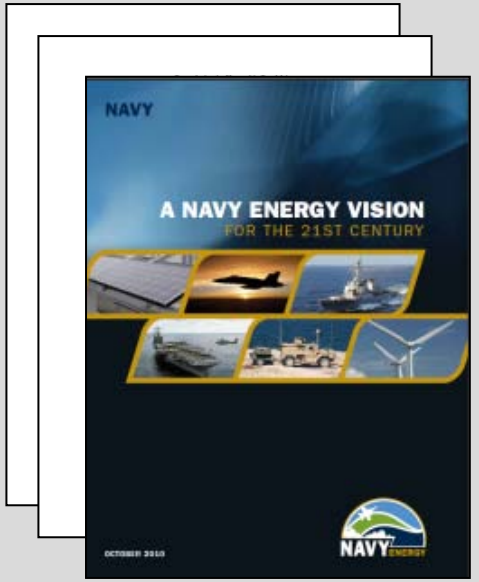
Determine Possible Solutions



Improve Energy Efficiency







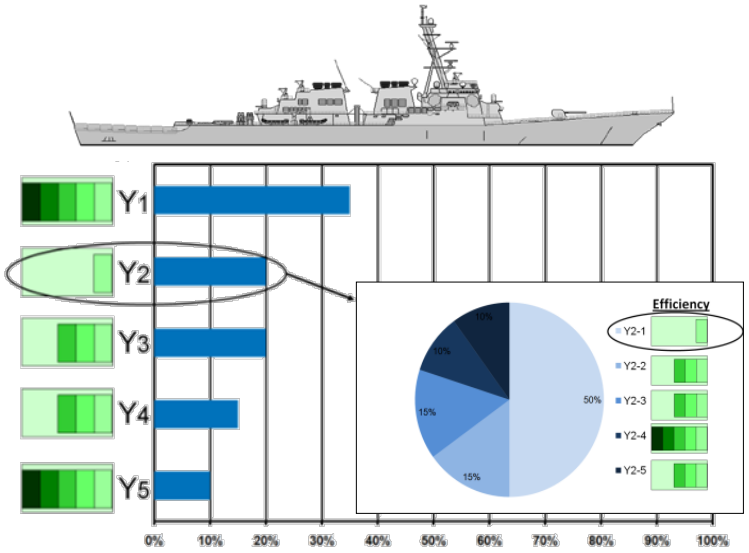
Policy & Guidance

- Sets the tone and goals for framing technology development investment decisions based on cost, technical maturity, risk, and overall fuel savings.
- Navy leadership is increasingly proactive with SECNAV, CNO, and Fleet Goals for fuel savings as Navy technical agents investigate energy efficient ship designs and equipment procurement.

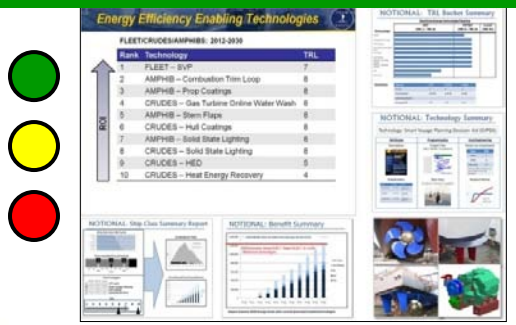
Perform Analyses

Analyzing Fuel Consumption and Identifying Inefficiencies

- Developing a baseline for energy consumption on Ships is key to making meaningful investment decisions in Energy Efficiency Enabling Technologies (E3Ts).
- In the development of a baseline on Ships, inefficiencies and large power consumers will be identified providing a higher fidelity view of the current profile, allowing more informed investment decisions.



Energy Decision Framework



Evaluate Energy Scorecards

ENABLED BY

MARITIME ENERGY

PORTFOLIO PROCESS

INITIATIVE							
FFRADP							
4 MW SSTG / PDSS RDTE							
Energy Storage RDTE							
Smart Voyage Planning / Fleet Sch							
Nuclear Studies							
Hull Coatings							
Propeller Coatings							
Combustion Trim Loop							
L-Ship Directional Stability							
Online GT Waterwash							
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Solid State Lighting (Amphib)							
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Stern Flaps (LHD)							
Stern Flaps (LSD)							
HED OPN							
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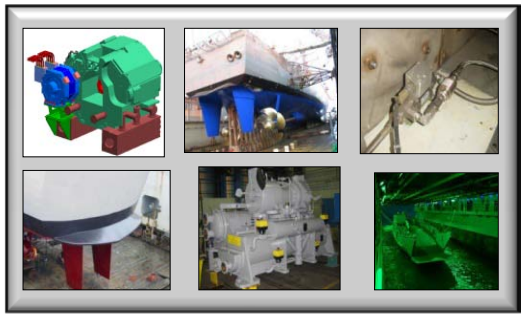
LM2500 Efficiency OPN	0.0	0.0	0.0	8.0	12.0	20.6 M$	OPN
Energy Dashboard / Hydrodynamics	5.1	1.0	0.8	0.2	1.9	9.6 M$	RDTE
TOTAL	38.4	44.3	65.5	92.1	93.5	333.8	

Budget



Develop Implementation Plan

1. Improve Energy Efficiency

Define

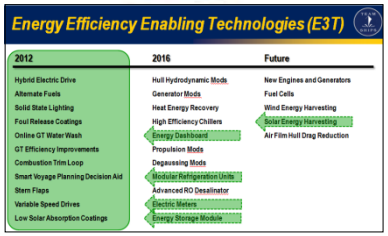
Measure

Analyze

Control

2. Perform Analyses

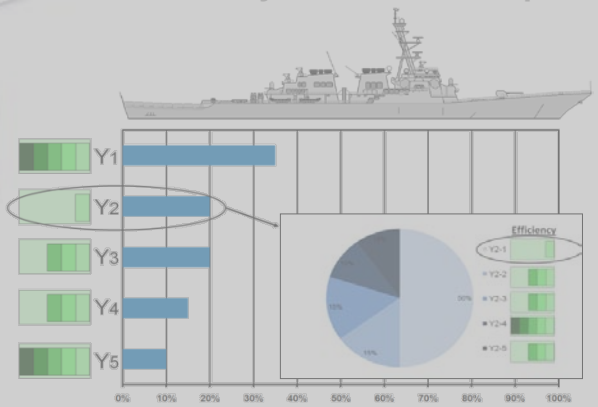
3. Examine Technology Candidates



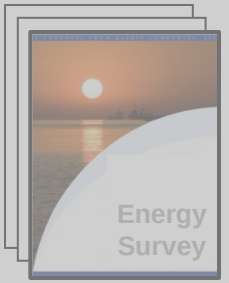
Determine Possible Solutions

Policy & Guidance

Analyze Fuel Consumption



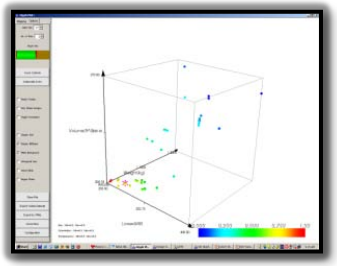
Identify Inefficiencies



Maritime Energy Portfolio Process

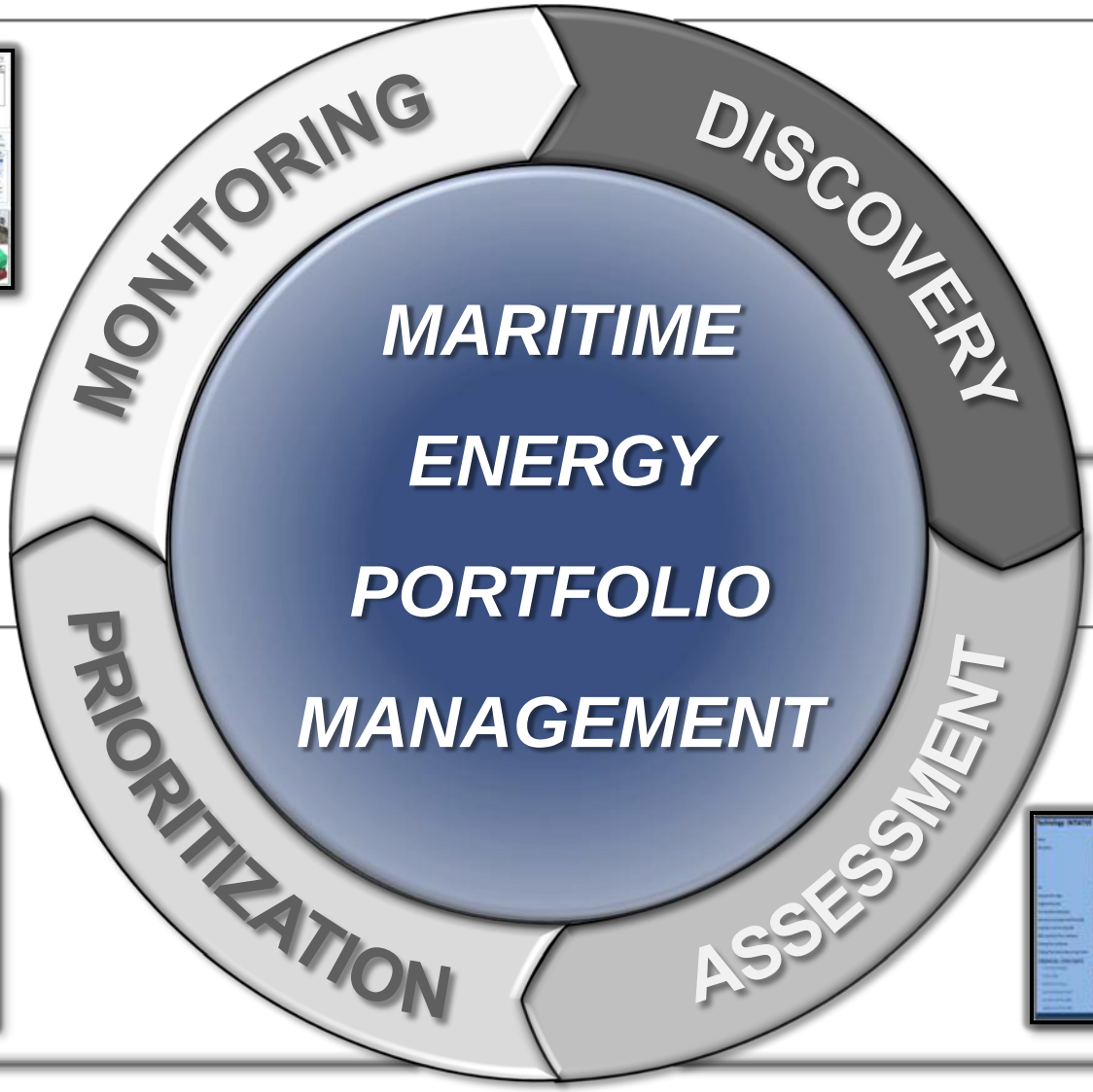
Impact
Performance

Outreach
Collaboration

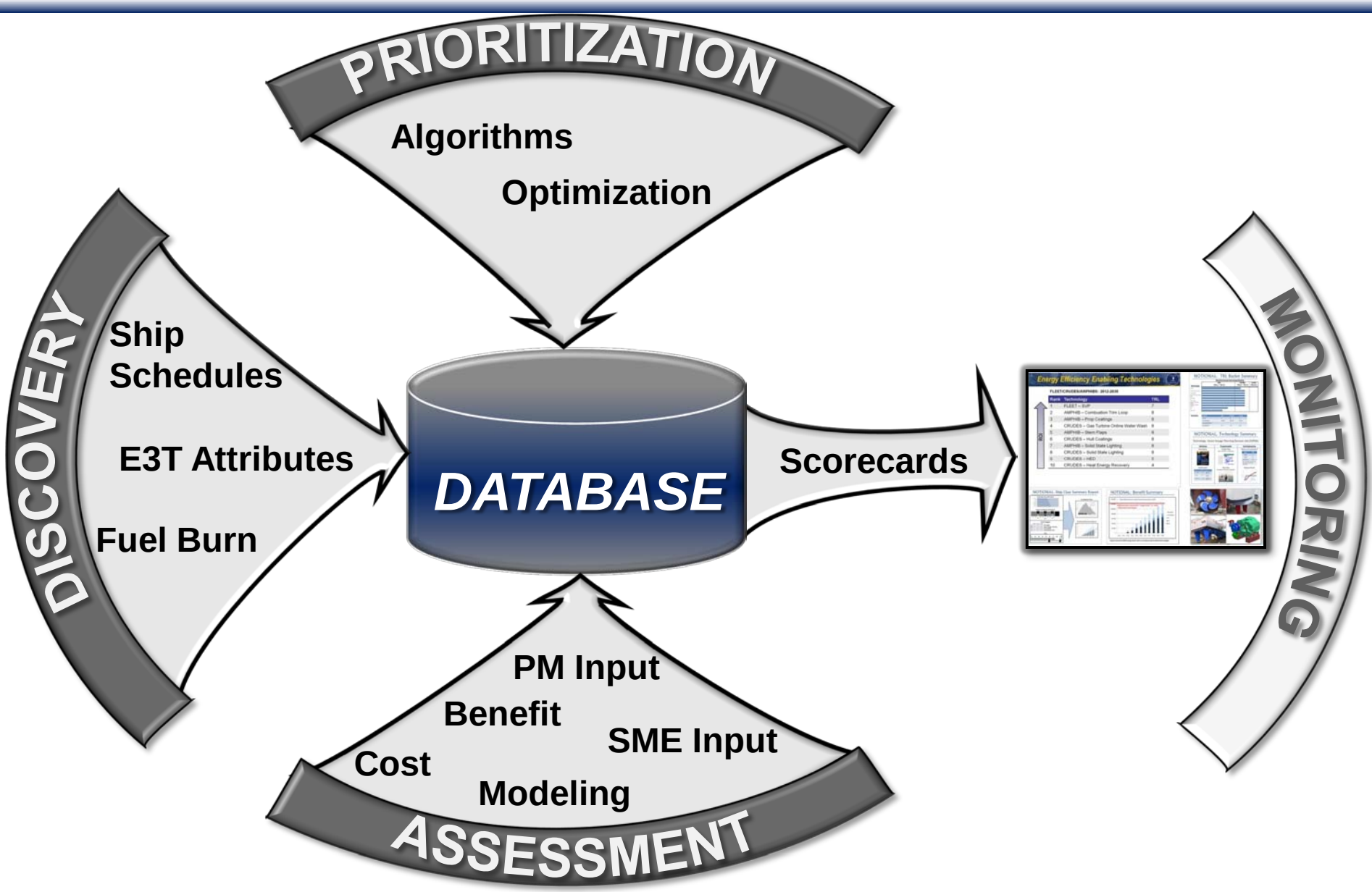


Optimization
Metrics

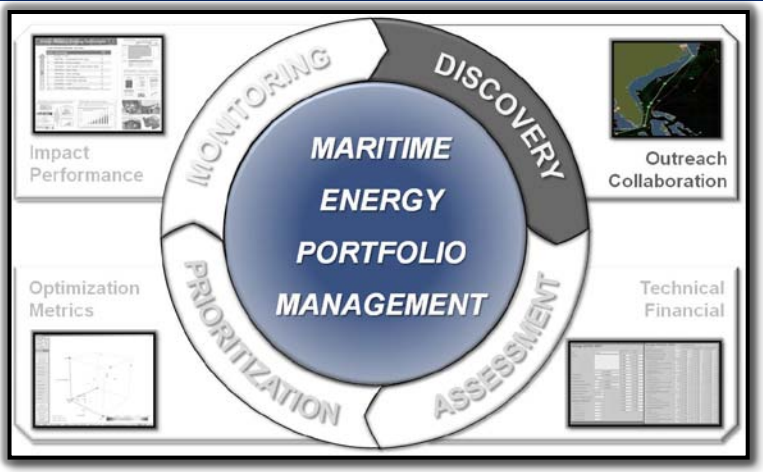
Technical
Financial



Data Flow


PRIORITIZATION
Algorithms
Optimization
DISCOVERY
Ship Schedules
E3T Attributes
Fuel Burn
DATABASE
Scorecards
MONITORING
PM Input
Benefit
SME Input
Cost
Modeling
ASSESSMENT

Case Study: Smart Voyage Planning Decision Aid
DISCOVERY



COLLABORATION

Identify technology stakeholders

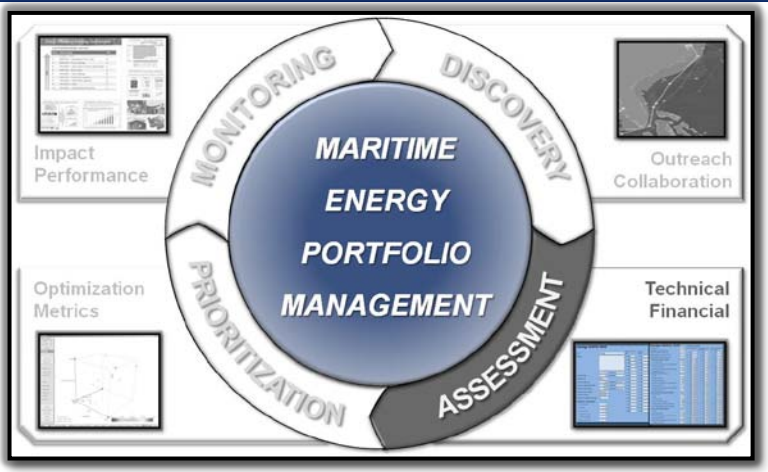
- Oceanographer & Navigator of the Navy
- METOC Community
- Task Force Energy Maritime Working Group

DESCRIPTION

Determine what the technology does and how it operates

- Optimizes ship routing for both maximum fuel efficiency and safety
- Fleet Weather Centers will push fuel efficient routes to all Navy ships
- Reduces energy consumption by considering:
  - Weather
  - Waves
  - Currents
  - Ship specific hydrodynamic data

Case Study: Smart Voyage Planning Decision Aid
ASSESSMENT



TECHNICAL

Perform technical modeling and simulation and receive input from Subject Matter Experts

- Military User Assessment
  - Ashore Demonstration at Fleet Weather Centers
  - At Sea Demonstration on T-AKE 7
- Successful Implementation in Commercial Shipping

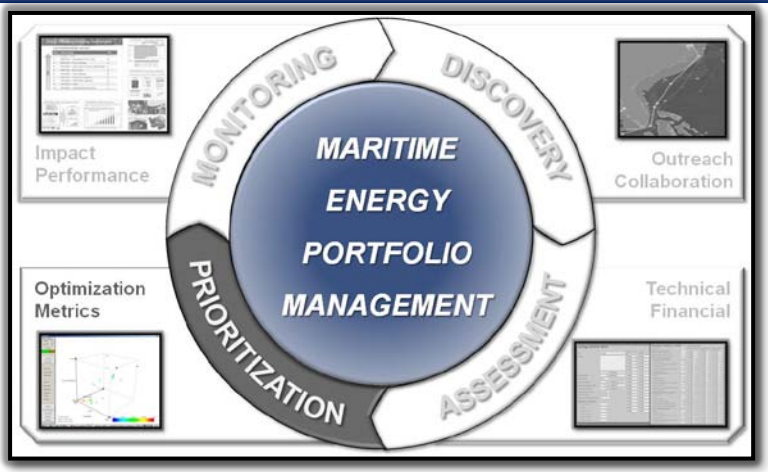
FINANCIAL

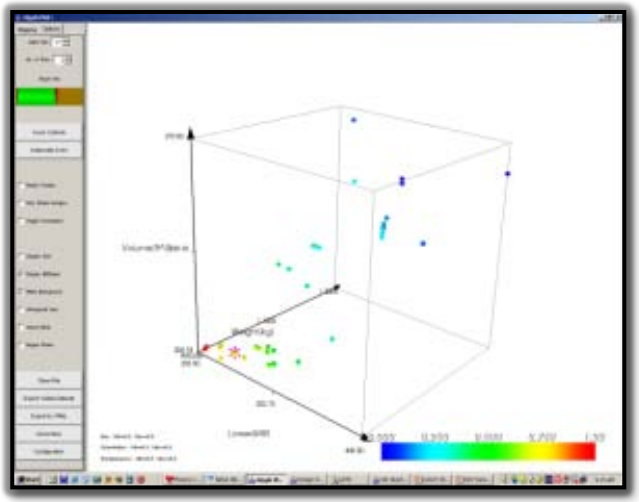
Perform Cost Benefit Analysis and receive input from Program Manager

- Anticipated 3% Fuel Savings Across Navy Ships
- Anticipated Payback Period of Less Than 1 Year

IDENTIFIED AS QUICK-WIN OPPORTUNITY

Case Study: Smart Voyage Planning Decision Aid
PRIORITIZATION





METRICS

Track KPPs to use as algorithm inputs

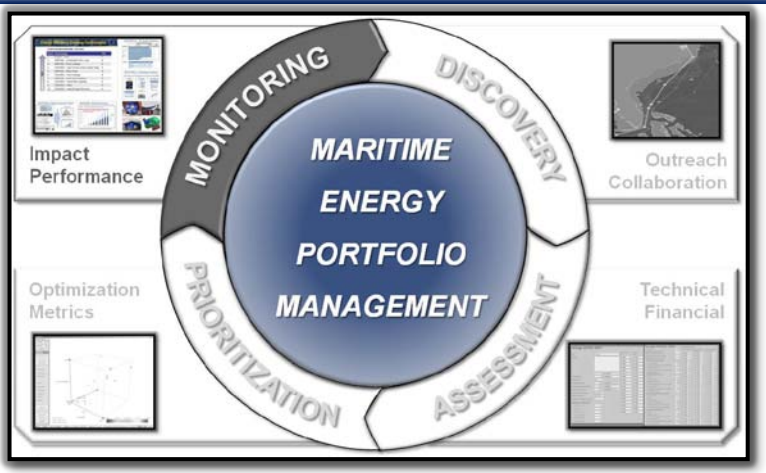
- Benefit: Fuel Savings
  - 3% Across All Navy Ships
  - 280,000 BBLS Annually
  - 17% of CNO Goal
- Payback Period
  - Less Than 1 Year
- Technical Maturity
  - Technology Readiness Level 6

ALGORITHM

Follow algorithm to determine best solutions for achieving Navy Energy Goals

- Implementation Requirements
- Funding Availability
- Product Availability

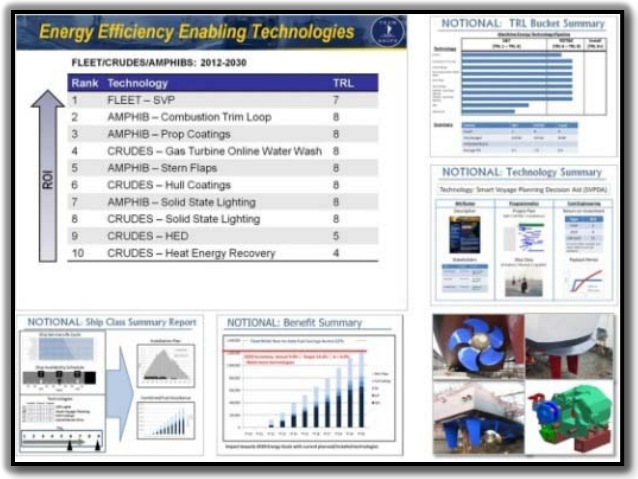
Case Study: Smart Voyage Planning Decision Aid
MONITORING



IMPACT – NOTIONAL

Calculate projected impact on Navy Energy Goals of reduced fuel consumption

- 280,000 BBLS Saved Annually
- 17% of CNO Goal



PERFORMANCE – NOTIONAL

Evaluate projected impact against actual impact

- 4% Fuel Savings Realized vs. 3% Projected Fuel Savings
- 375,000 vs. 280,000 BBLS Saved Annually
- 22% vs. 17% of CNO Goal

Conclusions/Next Steps

- Portfolio Infrastructure Allows for Quicker, Repeatable Responses
- Perform Disciplined Cost Analysis to Make More Informed Decisions
- Form Collaborative Relationships to Meet Our Goals of Reduced Energy Consumption and Increased Energy Efficiency

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